BETWEEN IMPRUDENT AND IMPOSSIBLE, SURVIVABILITY IMPLICATIONS OF THREAT ANALYSIS OR WHAT THREATS SHOULD WE DESIGN AGAINST? (U)

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ABSTRACT (U)

(U) This paper examines the threat analysis implications for combat vehicle design. It attempts to specify the proper threat analysis, which lies somewhere between designing the vehicle against all threats and designing against one specific threat. In doing so the paper discusses current threat analysis for defense acquisition, its problems and strengths while illustrating some pitfalls in threat analysis and their effects. The paper also discusses the notion of platform survivability vs. force survivability and how the threat analysis can be different in each case.

(U) Introduction

(U) In attempting to assess the survivability of a combat platform, or of the value of a new survivability technology incorporated onto an existing or projected platform, the first question the modeler asks is "What is the threat?" Unfortunately, this is not a straightforward question to answer. It is the purpose of the present paper to offer the reader those insights into developing the threat that have resulted from the interaction of a modeler and a threat analyst over the course of several platform studies.

(U) It's Imprudent to Design Against a Single Threat

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(U) This is nearly so obvious that it's mentioned here only because it is sometimes forgotten. Here, by a single threat is meant a single class of threats, such as KE rounds from a main tank gun. It occasionally happens that some particular threat appears so threatening that protection against other threats is slighted in order to protect against the threat that is perceived to be the most dangerous threat. As an example, perhaps too much attention has been given to top attack threats. A good threat analysis together with a balanced and thoughtful trade-off analysis is thus the best remedy against the perceived urgency of protecting against THAT threat.

(U) It is perhaps only in the far and misty past that there has been a battlefield with only a single threat deployed. That is, in any battle in recorded history there have been numerous threats on the battlefield. To protect platforms against just one of them, even if one of them is in fact the overwhelming threat, provides a too easy entry for the enemy to counter our protection efforts. This simply means that reactive threats must be considered, that is, a design against one threat will prompt the enemies' development or deployment of new or different threats.

(U) There is another important point regarding designing against a single threat that needs to be made. Namely, the generally made assumption that a design which defeats larger threats will automatically defeat smaller threats. For example, a composite armor designed to defeat 14.5mm armor piecing (AP) rounds, may not necessarily defeat 12.7mm Saboted Light Armor Piercing (SLAP) rounds.

(U) A last point regarding survivability at the force, rather than the platform, level. At the force level, the Army clearly cannot afford to concentrate on a single national or regional threat, since the Army's mission is to be capable of global projection.

(U) Thus, with respect to the survivability of either a platform or the force, over concentration on protecting against a single threat is very imprudent.

(U) Why We Can't Design Against All Threats

(U) We've seen that it's imprudent to design against a single threat. Now we need to reiterate another nearly obvious fact: the impossibility of designing against all threats. This fact has been made abundantly clear in the last several decades by the now universally understood fact that armor can no longer be the sole answer to platform protection. That is, there are vehicle design issues such as weight, size, cost, power consumption, deployability, and doctrine that must be considered and traded off, each against the others.

(U) Why can't we design against all threats? First, on an intelligence level, we may not even be aware of all threats. But suppose we assume, as we must, that those threats we are ignorant of are neglected from our analysis, then we still will be unable to design against all of the remaining threats. The reason for this is burdens. In general, the totality of threats to a particular platform will always overpower any combination of measures employed to protect against them, since there are limits as to what is allowable regarding cost, weight, power, size, and possibly other factors that will

affect the design and selection of a platform protection package. It follows then that an early step in designing platform protection is to reach a fuller understanding of exactly what constitutes the threat. In addition, however, there are other questions which must be addressed before the threat can be determined. Questions such as: What are the scenarios that are envisioned for the platform? How are the various scenarios to be weighted? How will the platform fight? What role shall doctrine play in determining the threat? These are exceedingly complex questions, and their is no one answer that will be universally applicable.

(U) Nevertheless, decisions will be made, and a collection of threats determined, with each threat weighted as to its likelihood of employment against the platform under analysis. Thus, the question to be answered reduces to: Which threats to include and what weight to give each included threat.

(U) Current Threat Analysis

(U) By DoD policy and Army regulation the threat analysis document for an acquisition program is the System Threat Analysis Report (STAR). The STAR is a comprehensive description of the threat against a particular acquisition program. It shows the current and projected threat to a range of fifteen years. Basically, it's an information dump covering all threats that the system could potentially encounter. Generally, it provides charts of only inventory quantities as opposed to regional quantities. It fails to provide any data relating to the probability of encountering particular threats, and it provides little accounting of enemy training, doctrine, or force structure.

(U) Pitfalls of Threat Analysis

(U) Single Threat Fixation: In the Single Threat Fixation, the threat analyst or vehicle designer fixates on a single threat as the most likely or most dangerous threat and skews the vehicle design to counter it. This fixation is usually done without regard to the vehicle's intended mission or the doctrine and tactics that will postulate the vehicle's use. It also does not take into account the threat force's capability to actually field or use such a weapon nor their intended doctrine or tactics. An example of such a trend is the recent attempts to make all vehicles "mine survivable" without conducting a proper analysis of actual mine losses, the history of which may show in fact that mines have had little impact on the force's mission success. For example, a fixation on the mine threat to a light armored vehicle could cause armor weight allotted for direct fire threats to be diverted to mine protection whereas a doctrinal solution to mines could mitigate mine danger.

(U) The "Threat De Jour": This is a threat that is given popularity by the civilian media and then the political-military leadership begins to take note and gives emphasis to that threat. Land mines are again a good example. In the US deployment to Bosnia and again in the recent deployments to Afghanistan, there was much mention in the press regarding the "large amounts" of mines in these regions with the implication that high casualties will be produced as a result. This prompted sudden, emergency mine survivability designs to be sought for retrofit to the existing fleet when in many cases the vehicles could not accept such designs. However, the solution to mines was

already there in the existing tactical and mobility doctrine of the force. Furthermore, mines became a 'cause celebre' by celebrities, thus causing a further overemphasis on mine survivability upon vehicle design. Another example was the threat of the long range of Iraqi artillery just prior to Desert Storm. Some Iraqi artillery did out range western artillery and this became a concern in the press and with congress. However the threat was not real, as the Iraqis had no means to observe fires at such ranges.

(U) Conventional Wisdom Threat: This is the threat that "everyone 'knows' is the greatest threat" even without any evidence to support it. A good example of the conventional wisdom threat is the AK-47. A recent vehicle design was almost influenced by the conventional wisdom that terrorists and guerillas mostly use the AK-47 Assault Rifle chambered in 7.62x39mm. However, only a proper analysis of the region where this vehicle was to be used showed that the more common weapons were those that use the more powerful NATO 7.62x51mm cartridge.

(U) Pie-in-the-Sky Future Threat: This threat is frequently generated by an intelligence analyst who specializes in one particular area or munition type. Although the analyst's predictions of the future use and analysis of the new weapons are valid, the threat becomes overemphasized for many reasons. First, the uniqueness and newness give the threat a sort of appeal that generates interest. Also, the threat analysts in these cases are usually prolific writers and great speakers, thus they "advertise" their threats more than the humdrum run-of-mill threats that pervade the battlefield. In addition, this type of threat can gain momentum from a survivability engineer who takes on countering the threat as a crusade. The Pie-in-the-sky threat is the best reason why the vehicle program's threat analyst needs to remain independent of the intelligence production center and the designer of the vehicle; he should remain, an "honest broker." Two recent examples of this are top-attack munitions and high-power microwave devices.

(U) Reflexive Threat (We Have It Therefore They Have It): This is simply mirroring US capabilities on the threat side. This type of assumption can give a false analysis that a potential foe may be more technologically advanced than he really is. An example of this is assuming enemy fixed-wing close air support, when US is about the only country that performs this. The converse of this can also occur where one assumes his foe is not educated or sophisticated enough to use technologically advanced weapons. Another variation of this type of threat pitfall can also be concerned with the tactical use of weapons. For example, the mistake is made in assuming that the enemy will only use a weapon like we intend for it to be used. A recent example of unintended use was the Somali use of the RPG to shoot down Black Hawk helicopters in Mogadishu. Who would have thought that someone would use an anti-tank weapon, that has a large back blast, to shoot upwards at flying machines?

(U) Tips and Enhancements For Good Threat Analysis

(U) Always answer the "threat trinity:" 1. What is the most dangerous threat? 2. What is the most proliferated threat? 3. What threat is the most likely to be encountered?

(U) Take a look not only at the threats to the platform and its survivability but look at the threats to the force as a whole. This applies to the survivability of the force and its ability to continue the mission with as few casualties as possible.

(U) The threat and survivability should be analyzed from a force view point as well as a single platform viewpoint. The threat analysis should look at the enemy's current tactics and doctrine as well as the technical aspects of their weapon's systems. These questions should be answered: How does the threat force intend to use the weapon system in combat? Do they have a doctrine in place to do so? Are their soldiers trained well enough to use the weapon as intended and to its maximum capability? Do the soldiers have the capability and education required to learn how to use the weapons? Also, the Threat's ability to adapt their doctrine and tactics to react to the introduction of our new system onto the battlefield needs to be examined. A note of caution is necessary. It is better to overestimate than underestimate in looking at the human aspects such as education, training and soldier capabilities. It would be prudent to assume that a force can be trained better than they actually are. This is the "elevator safety factor" applied to combat vehicle design. However, one must not overestimate enemy capabilities too much or one risks being accused of painting the threat as being "ten feet tall." This tends to turn the designers and developers to discounting the threat analysis. Overestimating the opposing soldier is akin to overestimating the opposing threat with this difference: It is easier and quicker for an opponent to increase the capabilities of his soldiers than it is to develop and procure more capable equipment.

(U) The threat analyst must have a full understanding of the doctrinal use intended for the new platform. He must know where in the spectrum of war (Operations Other than War, Small Scale Contingencies, Major Threat of War etc.) the system will fight and how the enemy will look in that spectra. The analyst must understand the vehicle's mission and that of the force it is to be a part of.

(U) A good reading and understanding of the Defense Planning Guidance (DPG) document is important for the analyst to comprehend the platform's mission. Especially important are the projected scenarios in the document. A recommendation may be for Defense Intelligence Agency to host a DPG seminar each year or so for those intelligence analysts who support acquisition and combat development.

(U) Probability of Encounter Threat Trees, wargaming, models, and simulations are great tools to aid in the threat analysis. This is an area where training and familiarization needs to be available for the AMC Foreign Intelligence Offices and the TRADOC Threat Managers.

(U) The current establishment of specialized intelligence analysts at the national production centers and general threat analysts at the AMC Foreign Intelligence Offices and the TRADOC Threat Managers is good and should remain. The relationships between the two should continue to be fostered by direct communication, yearly Threat Coordination Working Groups and seminars. AR 381-11 (Threat Support to U.S. Army Force, Combat, and Materiel Development) could enhance this issue by clearly defining the roles of each group of analyst as currently it is more

of a Gentleman's agreement.

(U) Implications for survivability resulting from a proper threat analysis

(U) Some survivability solutions may be "force" oriented. For example, instead of adding armor weight to a platform to improve mine survivability, it may be prudent to enhance your countermine doctrine and capabilities. Another example: in order to diminish the RPG threat, insure that combined arms training, doctrine, and tactics are followed. That is, instead of adding weight to a platform in order to specifically defeat the RPG it may be more effective to defeat the RPG gunner by sending in dismounted infantry to bayonet him.

(U) A proper threat analysis will permit the proper tuning of armor solutions. For example, realizing that 12.7mm SLAP is a threat may required an armor designed to defeat 14.5mm threats to be tuned also to defeat the SLAP.

(U) By fixing the proper spectra of war, a proper threat analysis, will help distinguish those countermeasures that have potential as part of a protective package from those countermeasures that need not be considered as part of a protective solution. For example, if HEAT weapons are present in the threat analysis, then an active protection system (APS) may be part of an appropriate countermeasure solution, whereas if only small arms are present in the threat analysis, then APS could immediately be eliminated as a possible survivability solution.

(U) Conclusion

(U) A proper and thoughtful threat analysis will aid in developing a combat vehicle that will be able to perform its mission and be adequately survivable during the conduct of its mission.